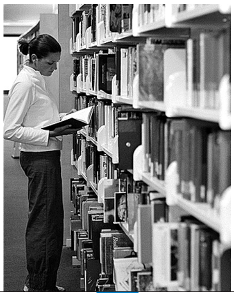
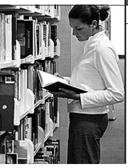


3

The development of the PISA context questionnaires



OVERVIEW

In its Call for Tender for PISA 2006, the PISA Governing Board (PGB) established the main policy issues it sought to address in the third cycle of PISA. In particular, the PGB required PISA 2006 to collect a set of basic demographic data as a core component that replicated key questions from the previous cycles. In addition, PISA 2006 needed to address issues related to important aspects of students' attitudes regarding science, information about students' experience with science in and out of school, motivation for, interest in and concern about science, and engagement with science-related activities.

Since the impact of out-of-school factors was considered of particular interest in a cycle where science was the major domain, the PGB recommended the inclusion of a parent questionnaire as an optional instrument, in order to collect additional information on issues such as science-related parental expectations and attitudes, as well as possible family investment in activities aimed at developing students' interest and learning in scientific areas.

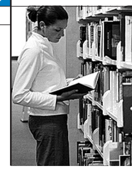
The PISA 2006 Project consortium undertook the operationalisation of these goals with the assistance of a variety of experts. In particular, a Questionnaire Expert Group (QEG) was established, consisting of experts from a variety of research backgrounds and countries (see Appendix 8). The consortium and the QEG worked together to develop the contextual framework for PISA 2006 and the contextual instruments. Other experts were consulted where appropriate, especially some members of the Science Expert Group.

An initial step was the development of an organising conceptual structure which allowed the mapping of the PGB's priority policy issues to the design of PISA 2006. One important objective of the conceptual structure was to facilitate the development and choice of research areas that combine policy relevance effectively with the strengths of the PISA design. To aid this, a set of criteria established by the INES (International Indicators of Educational Systems) Network A were used:

- First, the research area must be of enduring policy relevance and interest. That is, a research area should have policy relevance, capture policy-makers' attention, address their needs for data about the performance of their educational systems, be timely, and focus on what improves or explains the outcomes of education. Further, a research area should be of interest to the public, since it is this public to which educators and policy-makers are accountable;
- Second, research areas must provide an internationally comparative perspective and promise significant added value to what can be accomplished through national evaluation and analysis. This implies that research areas need to be both relevant (*i.e.* of importance) and valid (*i.e.* of similar meaning) across countries;
- Third, there must be some consistency in the approach of each research area with PISA 2000 and PISA 2003;
- Fourth, it must be technically feasible and appropriate to address the issues within the context of the PISA design. That is, the collection of data about a subject must be technically feasible in terms of methodological rigour and the time and costs (including opportunity costs) associated with data collection.

The resulting research areas are listed below and described in more detail later in the chapter:

- Student's engagement in science
- Science attainment and the labour market
- Teaching and learning science
- Scientific literacy and environment
- Organisation of educational systems



THE CONCEPTUAL STRUCTURE

A conceptual framework for PISA 2006

Both the basic criteria for developing a conceptual framework presented above, and more comprehensive reviews of educational models (Scheerens and Bosker, 1997) reveal the complexity of variables and relationships that potentially influence student outcomes. The field is at the crossroads between a number of sociological, psychological, and cognitive theories, which all contribute important components to the overall picture.

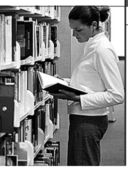
Developing a new single, encompassing educational model for PISA would add little value to the many models already available in the literature. Rather than imposing unnecessary theoretical constraints on the thematic analyses that will be conducted using the study database, the primary role of the PISA conceptual structure for questionnaire development was to map the many components of existing models, to ensure that none of the essential dimensions are omitted from the data collection. These components were then checked against the general framework used for the OECD education indicators (INES) and the PGB priorities for PISA 2006.

This mapping also facilitated discussions around the feasibility and appropriateness of implementation within the constraints of the PISA design. In particular, the following aspects were considered, both in terms of restrictions and of potentialities related to the study design:

- PISA measures knowledge and skills for life and so does not have a strong curricular focus. This limits the extent to which the study is able to explore relationships between differences in achievement and differences in the implemented curricula. On the other hand, consideration was given to the out-of-school factors with a potential of enhancing cognitive and affective learning outcomes;
- PISA students are randomly sampled within schools, not from intact classrooms or courses and therefore come from different learning environments with different teachers and, possibly, different levels of instruction. Consequently, classroom-level information could only be collected either at the individual student level or at the school level;
- PISA uses an age-based definition of the target population. This is particularly appropriate for a yield-oriented study, and provides a basis for in-depth exploration of important policy issues, such as the effects of a number of structural characteristics of educational systems (*e.g.* the use of comprehensive vs. tracked study programmes, or the use of grade repetition). On the other hand, the inclusion in the study of an increasing number of non-OECD countries (where the enrolment rate for the 15-year-olds age group is maybe less than 100%) requires that retention be taken into account in the analysis of between-countries differences;
- The cross-sectional design in PISA does not allow any direct analysis of school effects over time. However, the cyclic nature of the study will permit not only the investigation of change in the criterion measures, but also in the effects of rates of change in the predictor variables.

Many conceptual models to explain learning outcomes distinguish different levels that relate both to the entities from which data might be collected and to the multi-level structure of national education systems (Scheerens 1990). Four levels can be distinguished:

- The education system as a whole (setting the context for teaching and learning);
- The educational institutions (schools but also other providers of education);
- The instructional setting and the learning environment within the institutions (classrooms, courses);
- The individual participants in learning activities (students).



A second dimension commonly found in many conceptual models groups the indicators at each of the above levels further into the following categories:

- Antecedents are those factors that affect policies and the way instruction is organised, delivered and received. It should be noted that they are usually specific for a given level of the education system and that antecedents at a lower level of the system may well be policy levers at a higher level (*e.g.* for teachers and students in a school, teacher qualifications are a given constraint while, at the level of the education system professional development of teachers is a key policy lever);
- Processes group information on the policy levers or circumstances that shape the outputs and outcomes at each level;
- Indicators on observed outcomes of education systems, as well as indicators related to the impact of knowledge and skills for individuals, societies and economies, are grouped under outcomes.

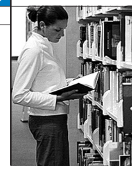
The four levels and the three aspects can be visualised as a two-dimensional grid with 12 potential variable types (Figure 3.1)). This basic conceptualisation has been adapted from the conceptual framework for the Second IEA Study of Mathematics (Travers and Westbury, 1989; Travers, Garden and Rosier, 1989) and also provided a conceptual basis for the planning of context questionnaires for the first two PISA surveys (Harvey-Beavis, 2002; OECD, 2005). As noted earlier, data on the instructional settings can only be collected at the individual or institutional level. However, conceptually they are still related to the level of the instructional settings (classroom, courses).

Figure 3.1 shows the basic components of this two-dimensional grid. It consists of four levels and variables at each level are classified as antecedents, processes or outcomes:

- At the system-level, the macroeconomic, social, cultural and political context sets constraints for the educational policies in a country. Outcomes at the system-level are not only aggregated learning outcomes but also equity-related outcomes;
- At the level of the educational institution, characteristics of the educational provider and its community context are antecedents for the policies and practices at the institutional level as well as the school climate for learning. Outcomes at this level are aggregates of individual learning outcomes and also differences in learning outcomes between sub-groups of students;

Figure 3.1
Conceptual grid of variable types

Antecedents	Processes	Outcomes
Level of the educational system		
Macro-economic, social, cultural and political context	Policies and organisation of education	Outcomes at the system level
Characteristics of educational institutions	Institutional policies and practice	Outcomes at the institutional level
Level of instructional units		
Characteristics of instructional units	Learning environment	Outcomes at the level of instructional units
Level of individual learners		
Student background and characteristics	Learning at the individual level	Individual learning outcomes



- At the level of the instructional units, characteristics of teachers and the classrooms/courses are antecedents for the instructional settings and the learning environment; learning outcomes are aggregated individual outcomes;
- At the student level, characteristics (like gender, age, grade) and background (like social status, parental involvement, language spoken at home) are antecedents for the individual learning process and learning outcomes (both cognitive and affective).

It should be noted that learning outcome variables consist not only of cognitive achievement but also of other potential learning outcomes. These include self-related cognitions (self-concept, self-efficacy), long-term interest in a subject or domain, educational expectations and aspirations as well as social outcomes like well-being and life skills.

While this mapping is useful for planning the coverage of the PISA questionnaires it is also important to supplement it with recognition of the dynamic elements of the educational system. System-level variables are important when interpreting relationships between variables at the lower levels and contradictory findings across countries are often due to differences in the structure of the educational systems.

From the existing conceptual frameworks and subsequent research one can derive hypotheses about (at least some of) the relationships between the elements in this two-dimensional grid. Typically, existing conceptual models assume antecedents to influence processes, which in turn produce learning outcomes, and conditions on higher levels are usually supposed to impact on those at lower levels (Scheerens, 1990).

Some models (Walberg 1984 and 1986; Creemers 1994) also expect that outcome variables have an effect on the learning process and, thus, allow for a non-recursive relationship between learning process and learning outcomes. Positive or negative experiences with subject-matter learning can influence process variables such as habits and attitudes towards the learning of a subject, increase or decrease the amount of time spent on homework, and so on. Another example is long-term interest in a subject or domain, which can be the outcome of learning but also affects the students' commitment to learning.

It also needs to be recognised that vertical or horizontal relationships might not be the only explanations for differences in learning outcomes. Antecedents at the school level, for example, are often influenced by process variables at the system level like educational policies. Another example is the possibility that the socio-cultural context (antecedent at the system level) might have an influence on instructional practices (process at the classroom level), which in turn leads to differences in student outcomes.

An important corollary of the intricate relationships between the various cells in Figure 3.1 is that each one of the observed variables is likely to convey multiple information (*i.e.* both information on the dimension that the variable is intended to measure, and information on related antecedents or process variables). For example, the variables identifying the study programme or grade of the students not only contain direct information on their instructional setting and curriculum, but, in many cases, also indirect information on students' probable prior level of achievement, maybe of their home background, and possibly some of the characteristics of their teachers.

In view of the complexity of potential relationships between these variable types, explicit causal relationships were not included in this conceptual mapping. There are too many potential relationships between these components (including cross-level relationships) that might be relevant for PISA and which could not be integrated into one 'general' conceptual model.

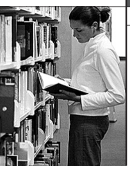
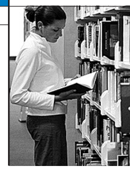


Figure 3.2
The two-dimensional conceptual matrix with examples of variables collected or available from other sources

	Antecedents	Processes	Outcomes
The education system as a whole	**Cell 1:** Macro-economic and demographic context *For example:* ▪ Gross Domestic Product ▪ Distribution of wealth (Gini index) ▪ Percentage of immigrants	**Cell 5:** Policies and organisation of education *For example:* ▪ Organisation of education (school autonomy, programme structure) ▪ Teacher qualifications and training requirements ▪ School entry age, retention	**Cell 9:** Outcomes at the level of the education system *For example:* ▪ System level aggregates of: reading, mathematical and scientific literacy ▪ Habits in relation to content domains ▪ Attitudinal outcomes ▪ Life skills and learning strategies ▪ Equity related outcomes
Educational institutions	**Cell 2:** Characteristics of educational institutions *For example:* ▪ The involvement of parents ▪ Social intake ▪ Source of funding, location and size ▪ Type of educational provider (*e.g.* out-of-school, educational media programme)	**Cell 6:** Institutional policies and practice *For example:* ▪ Instructional support including both material and human resources ▪ Policies and practices, including assessment and admittance policies ▪ Activities to promote student learning	**Cell 10:** Learning outcomes at the institutional level *For example:* ▪ Institution level aggregates of: reading, mathematical and scientific literacy ▪ Habits in relation to content domains ▪ Affective outcomes (*e.g.* attitudes to mathematics) ▪ Life skills and learning strategies ▪ Differences in outcomes for students of various backgrounds
Instructional settings	**Cell 3:** Characteristics of instructional settings *For example:* ▪ Teacher qualifications ▪ Classroom size	**Cell 7:** Learning environment *For example:* ▪ Ability grouping ▪ Teaching styles ▪ Learning time	**Cell 11:** Learning outcomes at the level of instructional setting *For example:* ▪ Classroom motivation to learn ▪ Average classroom performance
Individual participants in education and learning	**Cell 4:** Individual background *For example:* ▪ Parental occupational status ▪ Parental educational level ▪ Educational resources at home ▪ Ethnicity and language ▪ Age and gender	**Cell 8:** Individual learning process *For example:* ▪ Engagement and attitudes to science ▪ Self-concept and self-efficacy when learning science ▪ Motivation to learn science	**Cell 12:** Individual outcomes *For example:* ▪ Reading, mathematical and scientific literacy ▪ Affective outcomes (*e.g.* attitudes to science)



Therefore, this conceptual mapping provides a point of reference in the conceptual framework for PISA 2006 rather than as a general 'PISA model'. More detailed models should be developed for particular research areas and for specific relationships. Relevant variables in these more specific models, however, could still be located within this conceptual two-dimensional matrix.

Figure 3.2 shows examples of variables that were collected or are available for each cell of the two-dimensional conceptual matrix that has guided the development of context questionnaire for PISA 2006.

RESEARCH AREAS IN PISA 2006

PISA's contributions to policy makers' and educators' needs were maximised by identifying possible policy-relevant research areas and choosing carefully from among the many possibilities so that the strengths of the PISA design were capitalised on.

The following research areas were developed following recommendations from the Questionnaire Expert Group:

- Student's engagement in science: In part, this research area parallels the research area on engagement in mathematics in PISA 2003. However it has been expanded to incorporate aspects of the affective dimension more comprehensively, but in a way that is not bound to a 'cognitive unit context'. It covers self-related cognitions, motivational preferences, emotional factors as well as behaviour-related variables (such as participation in science-related activities in and out of school);
- Teaching and learning of science: This research area addresses how instructional strategies are used to teach science at school and to what extent science instruction is different across types of education and schools;
- Scientific literacy and environment: It is of interest to policy-makers to what extent schools contribute to the awareness of and attitudes toward environmental problems and challenges among 15-year-old students. This is an area related to scientific literacy (OECD, 2006) and school instruction in this area can be regarded as a potential source of information;
- Organisation of educational systems: This research area explores the relationships between scientific literacy and structural characteristics of educational systems, such as general vs. specialised curricula, comprehensive vs. tracked study programmes, centralised vs. decentralised management of schools;
- Science attainment and the labour market: The role and value of science education and scientific literacy as a preparation for future occupation are discussed in this research area, both in terms of students' expectations and school practices concerning orientation and information for students about science-related careers.

The following two research areas had been also been developed but were not retained for the main survey after reviewing the field trial results and after the PGB decided on the priorities for the final data collection:

- Student performance and gender: This research area focused on student performance in all three major domains and comprised not only data from PISA 2006 but also from previous PISA cycles and previous international studies (IEA mathematics and science studies, IEA reading literacy studies);
- Parental investment and scientific literacy: This research area was concerned with the effects of parental involvement and parenting styles on students' science-related career expectations and scientific literacy.

Table 3.1 shows for each research area the main constructs and variables that were included in the PISA 2006 main data collection to explore each of the research areas.

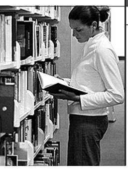
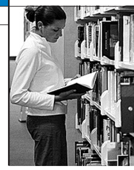


Table 3.1
Themes and constructs/variables in PISA 2006

Research area	Constructs or variables
Student engagement in science	Science self-efficacy (StQ)
	Science self-concept (StQ)
	Interest in learning science (StQ)
	Enjoyment of learning science (StQ)
	Instrumental motivation to learn science (StQ)
	Future-oriented science motivation (StQ)
	General value of science (StQ)
	Students' personal value of science (StQ)
	Students' science-related activities (StQ)
	Parents' general value of science (PaQ)
	Parents' personal value of science (PaQ)
Teaching and learning of science	Interactive science teaching (StQ)
	Hands-on science teaching activities (StQ)
	Student investigation in science lessons (StQ)
	Science teaching with focus on applications (StQ)
	Time spent on learning science (StQ)
Scientific literacy and the environment	Students' awareness of environmental issues (StQ)
	Students' perception of environmental issues (StQ)
	Students' environmental optimism (StQ)
	Responsibility for sustainable development (StQ)
	School activities to promote environmental learning (ScQ)
	Parents' perception of environmental issues (PaQ)
	Parents' environmental optimism (PaQ)
Organisation of educational systems	School size, location and funding (ScQ)
	Grade range (ScQ)
	Class size (ScQ)
	Grade repetition at school (ScQ)
	Ability grouping (ScQ)
	Teacher-student ratio (ScQ)
	Computer availability at school (ScQ)
	School selectivity (ScQ)
	School responsibility for resource allocation (ScQ)
	School responsibility for curriculum & assessment (ScQ)
	School accountability policies (ScQ)
	Assessment practices (ScQ)
	Activities to promote engagement with science learning
	Teacher shortage (ScQ)
	Quality of educational resources (ScQ)
	Parents' perception of school quality (PaQ)
Science attainment and the labour market	School preparation for science career (StQ)
	School information on science careers (StQ)
	Expected occupation at 30 (StQ)
	Career preparation at school (ScQ)
	Student's science activities at age 10 (PaQ)
	Parents' views on importance of science (PaQ)
	Parents' view on student's science career motivation (PaQ)

Note: StQ = Student questionnaire; ScQ = School questionnaire; PaQ = Parent questionnaire.



THE DEVELOPMENT OF THE CONTEXT QUESTIONNAIRES

From the theoretical bases of each research area, as elaborated, a large number of constructs were defined and their measurement operationalised through obtaining or writing questionnaire items (often in item batteries to form scales).

Small scale trials were undertaken in a range of countries and languages. Firstly a pre-pilot with a small convenience sample was undertaken in Australia. It involved a think aloud process where students were asked to complete the questionnaire while verbalising their thought processes. The pre-pilot provided qualitative feedback on the understanding and appropriateness of the items. After refining the items in light of the pre-pilot results, a series of pilot studies was undertaken in Japan (Japanese), Germany (German), Canada (French) and Australia (English). The pilots consisted of collecting questionnaire data from small convenience samples in each country. After data collection, students were collectively interviewed about their understanding of each question, particularly probing for relevance and ambiguity. The pilot therefore yielded both quantitative and qualitative data, plus conducting group interviews on the questions.

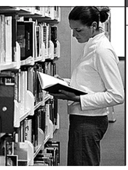
After further refinement of the questions, data was gathered in 2005 from a full scale field trial of student, school and parent questionnaires in each of the 57 participating countries in over 40 languages. The field trial was able to facilitate the investigation of a large number of student questionnaire items through the use of a rotational design with four questionnaire forms that were randomly allocated to students.

In addition, the field trial was used for in-depth analysis of the following aspects:

- Two sets of items were trialled as dichotomous and Likert-type items in parallel forms to explore cross-cultural differences in responses to either item type. Results showed some tendencies to more extreme responses in some countries but on balance it seemed more appropriate to use Likert-type items in the PISA questionnaires (Walker, 2006; Walker, 2007);
- Two sets of items were trialled with different category headings: Nine items measuring control strategies for science learning were trialled in one version asking about frequencies and in another one asking about agreement. Seven items measuring student participation in activities to protect the environment were trialled both with categories reflecting frequencies and with categories reflecting both frequency and intent. The field trial data were analysed to decide on the more appropriate but neither set of items was included in the final main study questionnaire;
- Two different sets of items measuring science self-efficacy were trialled. One set of items included asked about student confidence in tasks related to general science understanding, the other set about student confidence in doing science subject-specific tasks. Both of the item sets had good scaling characteristics and it was decided to retain the items measuring self-confidence in general science tasks due to a better fit with the science literacy framework;
- Student and parent questionnaire data were used to explore the consistency of responses regarding parental education and occupation. Results showed relatively high consistency between student and parent reports on occupation but somewhat lower consistencies for data on educational levels (Schulz, 2006).

Empirical analyses included the examination of:

- The frequency of missing values by country;
- The magnitude and consistency of item-total score correlations for each scale, by country;



- The magnitude and the consistency of scale reliability (Cronbach's Alpha), by country;
- The magnitude and consistency of correlations with each scale and science achievement as determined in the PISA field trial science test, by country;
- Exploratory and confirmatory factor analyses to determine construct validity and reliability of each scale across the pooled sample;
- Multiple-group models to assess the parameter invariance of factor models across countries;
- Item Response Theory (IRT) analyses to determine item fit for the pooled sample;
- Item-by-country interaction of items across countries using IRT scaling.

In addition to the empirical analyses, the choice of items, item format and wording was informed by:

- Direction from the PISA Governing Board;
- Feedback from National Project Managers;
- Feedback from linguistic experts;
- Discussions with the Questionnaire Expert Group;
- Discussions with members of the Science Expert Group;
- Consultation with science forum nominees of the PISA Governing Board;
- Consultation with the OECD secretariat.

Finally, in October 2005 a large and comprehensive set of potential items and topics was provided to the PISA Governing Board. From this set, the PGB indicated priority areas for investigation.

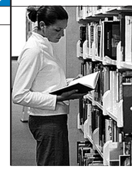
THE COVERAGE OF THE QUESTIONNAIRE MATERIAL

Student questionnaire

The student questionnaire was administered after the literacy assessment and it took students about 30 minutes to complete the instrument. The core questions on home background were similar to those used in PISA 2003, however, for some questions the wording was modified to improve the quality of the data collection based on experiences in previous surveys. Appendix 5 lists the core questions with changes in wording from PISA 2003 to PISA 2006.

The questionnaire covered the following aspects:

- Student characteristics: Grade, study programme, age and gender;
- Family background: Occupation of parents, education of parents, home possessions, number of books at home, country of birth for student and parents, language spoken at home;
- Students' views on science: Enjoyment of science, confidence in solving science tasks, general and personal value of science, participation in science-related activities, sources of information on science and general interest in learning science;
- Students; views on the environment: Awareness of environmental issues, source of information on the environment, perception of the impact of environmental issues, optimism about environmental issues and sense of responsibility for sustainable development;



- Students' views of science-related careers: Usefulness of schooling as preparation for the science labour market, information about science-related careers, future-oriented motivations for science and expected occupation at 30;
- Students' reports on learning time: Mode and duration of students' learning time in different subject areas and duration of students' out-of-school lessons;
- Students' views on teaching and learning of science: Science course taking in current and previous year, nature of science teaching at school (interactive, hands-on activities, student investigations and use of applications), future-oriented motivations to learn science, importance of doing well in subject areas (science, mathematics and test language subjects) and academic self-concept in science.

School questionnaire

The school questionnaire was administered to the school principal and took about 20 minutes to be completed. It covered a variety of school-related aspects:

- Structure and organisation of the school: Enrolment, ownership, funding, grade levels, grade repetition, average test language class size, community size and tracking/ability grouping;
- Staffing and management: Number of teachers, availability of science teaching staff, responsibility for decision-making at school and influences of external bodies on school-level decisions;
- The school's resources: Number of computers at school and principals' views on quality and quantity of staffing and educational resources;
- Accountability and admission practices: Accountability to parents, parental pressure on school, use of achievement data, parental choice of local school(s) and school admittance policies;
- Teaching of science and the environmental issues: School activities to promote learning of science, environmental issues in school curriculum and school activities to promote learning of environmental issues; and
- Aspects of career guidance: Students' opportunities to participate in career information activities, student training through local businesses, influence of business on school curriculum and structure of career guidance at school.

International options

As in previous surveys, additional questionnaire material was developed, which was offered as international options to participating countries. In PISA 2006, two international options were available, the ICT Familiarity questionnaire and the parent questionnaire.

Information communication technology (ICT) familiarity questionnaire

The ICT familiarity questionnaire consisted of questions regarding the students' use of, familiarity with and attitudes towards information communication technology which was defined as the use of any equipment or software for processing or transmitting digital information that performs diverse general functions whose options can be specified or programmed by its user. The questionnaire was administered to students after the international student questionnaire (sometimes combined within the same booklet) and it took about five minutes to be completed. It covered the following ICT-related aspects:

- Use of ICT: Students' experience with computers at different locations and frequency of ICT use for different purposes;
- Affective responses to ICT: Confidence in carrying out ICT-related tasks.

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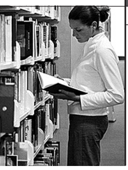


Parent questionnaire

The parent questionnaire covered both parental social background and aspects related to some of the research areas. It took about ten minutes to complete and one questionnaire was administered per student. The questionnaire covered the following aspects:

- Parental reports related to school and science learning: The students' past science activities, parental perceptions of value and quality of the student's schooling, parental views on science-related careers and parental general and personal value of science;
- Parental views on the environment: Parental awareness of environmental views and environmental optimism;
- Annual spending on children's education;
- Parental background: Age, occupation (both parents), education (both parents) and household income.

National questionnaire material

National centres could add nationally specific items to any of the questionnaires. Insertion of national items into the international questionnaires had to be agreed upon with the international study centre during the review of adaptations. National student questionnaire options, which took no longer than ten minutes to be completed, could be administered after the international student questionnaire and international options. If the length of the additional material exceeded ten minutes, national centres were requested to administer their national questionnaire material in follow-up sessions.

THE IMPLEMENTATION OF THE CONTEXT QUESTIONNAIRES

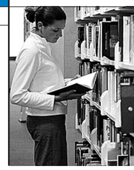
In order to make questions understood by 15-year-old students, their parents and school principals in participating countries, it was necessary to adapt parts of the questionnaire material from the international source version to the national context without jeopardising the comparability of the collected data. This is particularly important for questions that relate to specific aspects of educational systems like educational levels, study programmes or certain school characteristics which differ in terminology across countries.

To achieve maximum comparability, a process was implemented during which each adaptation was reviewed and discussed by the international study centre and national study centres. To facilitate this process, national centres were asked to complete a questionnaire adaptation spreadsheet (QAS), where adaptations to the questionnaire material were documented.

Each adaptation had to be reviewed and agreed upon before the questionnaire material could be submitted for linguistic verification and the final optical check (see Chapter 5). The QAS also contained information about additional national questionnaire material and any deviation from the international questionnaire format.

Prior to the review of questionnaire adaptations, national centres were asked to complete three different tables describing necessary adaptations:

- Study programme tables (STP): These document the range of different study programmes that are available for 15-year-old students across participating countries. This information was not only used as a codebook to collect these data from school records but also assisted the review of questionnaire adaptations;
- Language tables (LNT): These document the language categories included in the question about language use at home; and
- Country tables (CNT): These document the country categories in the questions about the country of birth for students and parents.



Information on parental occupation and the students' expected occupation was collected through open-ended questions both in student and parent questionnaires. The responses were then coded according to the International Standard Classification of Occupations (ISCO) (International Labour Organisation, 1990). Once occupations had been coded into ISCO, the codes were re-coded into the International Socio- Economic Index of Occupational Status (*ISEI*) (Ganzeboom, de Graaf & Treiman, 1992), which provides a measure of the socio-economic status of occupations comparable across the countries participating in PISA.

The International Standard Classification of Education (ISCED) (OECD, 1999) was used as a typology to classify educational qualifications and study programmes. The ISCED classification was used to get comparable data across countries. Whereas this information was readily available for OECD member countries, for partner countries and economies extensive reviews of their educational systems in cooperation with national centres were necessary to map educational levels to the ISCED framework.

Reader's Guide

Country codes – the following country codes are used in this report:

OECD countries

AUS Australia
AUT Austria
BEL Belgium
  BEF Belgium (French Community)
  BEN Belgium (Flemish Community)
CAN Canada
  CAE Canada (English Community)
  CAF Canada (French Community)
CZE Czech Republic
DNK Denmark
FIN Finland
FRA France
DEU Germany
GRC Greece
HUN Hungary
ISL Iceland
IRL Ireland
ITA Italy
JPN Japan
KOR Korea
LUX Luxembourg
  LXF Luxembourg (French Community)
  LXG Luxembourg (German Community)
MEX Mexico
NLD Netherlands
NZL New Zealand
NOR Norway
POL Poland
PRT Portugal
SVK Slovak Republic
ESP Spain
  ESB Spain (Basque Community)
  ESC Spain (Catalonian Community)
  ESS Spain (Castillian Community)
SWE Sweden
CHE Switzerland
  CHF Switzerland (French Community)
  CHG Switzerland (German Community)
  CHI Switzerland (Italian Community)
TUR Turkey
GBR United Kingdom
IRL Ireland
SCO Scotland
USA United States

Partner countries and economies

ARG Argentina
AZE Azerbaijan
BGR Bulgaria
BRA Brazil
CHL Chile
COL Colombia
EST Estonia
HKG Hong Kong-China
HRV Croatia
IDN Indonesia
JOR Jordan
KGZ Kyrgyztan
LIE Liechtenstein
LTU Lithuania
LVA Latvia
  LVL Latvia (Latvian Community)
  LVR Latvia (Russian Community)
MAC Macao-China
MNE Montenegro
QAT Qatar
ROU Romania
RUS Russian Federation
SRB Serbia
SVN Slovenia
TAP Chinese Taipei
THA Thailand
TUN Tunisia
URY Uruguay

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List of abbreviations – the following abbreviations are used in this report:

ACER	Australian Council for Educational Research
AGFI	Adjusted Goodness-of-Fit Index
BRR	Balanced Repeated Replication
CBAS	Computer Based Assessment of Science
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CITO	National Institute for Educational Measurement, The Netherlands
CIVED	Civic Education Study
DIF	Differential Item Functioning
ENR	Enrolment of 15-year-olds
ESCS	PISA Index of Economic, Social and Cultural Status
ETS	Educational Testing Service
IAEP	International Assessment of Educational Progress
I	Sampling Interval
ICR	Inter-Country Coder Reliability Study
ICT	Information Communication Technology
IEA	International Association for the Evaluation of Educational Achievement
INES	OECD Indicators of Education Systems
IRT	Item Response Theory
ISCED	International Standard Classification of Education
ISCO	International Standard Classification of Occupations
ISEI	International Socio-Economic Index
MENR	Enrolment for moderately small school
MOS	Measure of size
NCQM	National Centre Quality Monitor
NDP	National Desired Population
NEP	National Enrolled Population
NFI	Normed Fit Index
NIER	National Institute for Educational Research, Japan
NNFI	Non-Normed Fit Index
NPM	National Project Manager
OECD	Organisation for Economic Cooperation and Development
PISA	Programme for International Student Assessment
PPS	Probability Proportional to Size
PGB	PISA Governing Board
PQM	PISA Quality Monitor
PSU	Primary Sampling Units
QAS	Questionnaire Adaptations Spreadsheet
RMSEA	Root Mean Square Error of Approximation
RN	Random Number
SC	School Co-ordinator
SE	Standard Error
SD	Standard Deviation
SEM	Structural Equation Modelling
SMEG	Subject Matter Expert Group
SPT	Study Programme Table
TA	Test Administrator
TAG	Technical Advisory Group
TCS	Target Cluster Size
TIMSS	Third International Mathematics and Science Study
TIMSS-R	Third International Mathematics and Science Study – Repeat
VENR	Enrolment for very small schools
WLE	Weighted Likelihood Estimates

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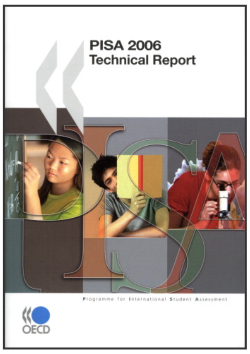

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